

Claims

What is claimed is:

1. A particle comprising chitosan, or a derivative thereof, and a polynucleotide.
2. The nanoparticle of claim 1, wherein said particle further comprises a lipid, and wherein said particle comprises a complex of said chitosan, said polynucleotide, and said lipid.
3. The particle of claims 1 or 2, wherein said polynucleotide encodes a cytokine.
4. The particle of any of claims 1 to 3, wherein said polynucleotide encodes interferon gamma.
5. A composition comprising a particle and a pharmaceutically acceptable carrier, wherein said particle comprises chitosan, or a derivative thereof, and a polynucleotide.
6. The composition of claim 5, wherein said particle further comprises a lipid, and wherein said particle comprises a complex of said chitosan, said polynucleotide, and said lipid.
7. The composition of claims 5 or 6, wherein said polynucleotide encodes a cytokine.
8. The composition of any of claims 5 to 7, wherein said polynucleotide encodes interferon gamma.
9. The composition of any of claims 5 to 7, wherein said polynucleotide encodes interferon gamma, and wherein said composition comprises an effective amount of said particle to inhibit T-helper type 2 (Th2)-associated airway inflammation and airway hyperresponsiveness when administered to a subject.

10. A method for delivery and expression of a polynucleotide within a host, said method comprising administering a particle to the host, wherein the particle comprises chitosan, or a derivative thereof, and a polynucleotide.

11. The method of claim 10, wherein the particle further comprises a lipid, and wherein the particle is a complex of the chitosan, polynucleotide, and lipid.

12. The method of claims 10 or 11, wherein the polynucleotide encodes a cytokine.

13. The method of any of claims 10 to 12, wherein the polynucleotide encodes interferon gamma.

14. The method of any of claims 10 to 13, wherein the particle further comprises a control sequence operably-linked to the polynucleotide.

15. The method of any of claims 10 to 14, wherein the host is a mammal.

16. The method of any of claims 10 to 15, wherein the particle is administered within a composition comprising a pharmaceutically acceptable carrier.

17. A method for enhancing interferon-gamma expression to regulate the production of cytokines secreted by T-helper type 2 (Th2) cells, said method comprising administering an effective amount of a particle to a subject, wherein the particle comprises chitosan, or a derivative thereof, and a polynucleotide encoding interferon-gamma.

18. The method of claim 17, wherein the subject is human.

19. The method of claims 17 or 18, wherein the subject is suffering from asthma.

20. The method of any of claims 17 to 19, wherein the particle is administered to the respiratory tract of the subject.

21. A method for producing a particle comprising a complex of chitosan, or a derivative thereof, and a polynucleotide, said method comprising mixing the polynucleotide and the chitosan or chitosan derivative, to form the particle.

comprising a complex of the polynucleotide and the chitosan or chitosan derivative. Optionally, the method further comprises mixing (complexing) a lipid with the polynucleotide and chitosan or chitosan derivative to form a particle (chlipid) comprising a complex of the polynucleotide, chitosan or chitosan derivative, and the lipid.

22. The method of claim 21, and wherein said method further comprises mixing a lipid with the polynucleotide and the chitosan or chitosan derivative, wherein the particle comprises a complex of the polynucleotide, chitosan or chitosan derivative, and the lipid.

23. The method of claim 22, wherein the lipid comprises a cationic lipid or phospholipid.